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## A New Unified Sea Ice Thickness Data Set

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**Abstract:** We propose to create a new unified sea ice thickness climate data record to better intercompare different ice thickness measurements, to better evaluate the changing state of the ice pack, and to better validate sea ice models. We would greatly improve the usefulness of these valuable data for the entire polar research community.

While ice extent is well-measured by satellite, monitoring ice thickness has been and remains a challenge. However the amount of ice thickness data available in the last few years has increased markedly, providing a large and growing resource. Existing observations of ice thickness span a variety of methods, accuracies, and temporal and spatial scales and are archived in a variety of different locations and in different formats. Each has its own strengths in terms of sampling or accuracy. The uncertainties are documented to various levels of detail for the different data sources but the documentation in general is spread throughout the literature. A concerted effort to collect as many observations as possible in one place, with consistent formats, and with clear and abundant documentation will allow the community to better utilize what is now a considerable body of observations. With a variety of data in one location and format, it will be much easier to compare the different sources with each other and with model output. The increased space and time coverage of a unified dataset will facilitate improved analyses of how and where sea-ice thickness has changed over the last three decades.

We will use data from both polar regions that are now available from moored and submarine based upward looking sonar (ULS) instruments, airborne electromagnetic (EM) induction instruments, and satellite laser altimeters (ICESat) provided to us by many different investigators. These instruments offer adequate sampling dating from 1975 to establish the mean ice thickness and thickness distribution for scales generally appropriate for change detection and climate model validations. The proposed data set will be the best approximation to a reference data set for sea ice thickness and only by using all of the available data and analyzing all of the biases will we obtain a reliable and extensive record of how the ice pack is changing.

The archive will include both the full measurements as acquired from the data providers (or links) and average values. The average values will be provide easy access for the change detection and modeling communities and will be for approximately one month of moored ULS data or 50 km of submarine, airborne, or satellite data. (Roughly 50 km or more of ice passes over a typical mooring site in a month and monthly output is commonly saved in model runs.) A web site will be created to provide easy access to the full data, the averaged data, and the documentation. We will work closely with the NOAA Arctic Research Program at PMEL to see that the data set is well publicized and we plan an EOS article to advertise the archive. The dataset will be transferred to the National Snow and Ice

Data Center at the conclusion of the project for permanent archival (an agreement is in place).